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The Vertical Partition of Oceanic Horizontal Kinetic Energy

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ABSTRACT

To produce an interpretation of the surface kinetic energy as measured by altimeters, a survey is made of the vertical structure of kinetic energy profiles in a large number of globally distributed long current meter records. Although the data are geographically confined primarily to a latitude band in the North Pacific, to the North Atlantic, and to a few moorings in the South Atlantic, the results show, generally speaking, that most regions are dominated by the barotropic and first baroclinic modes. Because of the near-surface intensification of baroclinic modes altimeters primarily reflect the first baroclinic mode, and thus the motion of the main thermocline. There is good quantitative agreement, with a few exceptions, with estimates of the surface kinetic energy obtained from the TOPEX/POSEIDON altimeter and from vertical extrapolations to the surface of the mooring profiles. These results are consistent with previous suggestions that barotropic models have little skill in depicting variability as seen in the altimeter data. An EOF analysis is shown to produce fictitious mode coupling unless the dynamical modes have very different energy levels.

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